NASA ACTIVITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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LETTER FROM WASHINGTON

Feb. 4, 1974

Dear Colleagues:

The President's budget for Fiscal Year 1975 has just been announced, and its provisions for NASA are encouraging.

We are asking Congress for an appropriation of $3,247 million for FY 1975. This is $245 million more than our appropriation for this year and $96 million more than our current budget plan.*

Despite this substantial increase, our proposed new budget does not bring us up to the level we had sought to maintain during the decade of the 1970s, a level of about $3.4 billion per year in terms of 1971 dollars, to allow for inflation. For example, we sought $889 million from the Office of Management and Budget for Space Shuttle development in FY 1975, but received only $800 million.

We will be able to move forward generally as planned, and make some important new starts in FY 1975, but we have been obliged to slow somewhat the development schedule for the Space Shuttle.

The first manned orbital flight of the Shuttle is

* Our current budget plan is based on the funds actually available to us in FY 1974. It includes our FY 1974 appropriation of $3,002 million, plus $111 million transferred from our FY 1973 appropriation and a proposed supplemental appropriation for FY 1974 of about $38 million to cover recent pay raises.

COVER

Artist's concept of the southeastern end of the three-mile-long Shuttle landing strip planned at KSC.

now expected to occur in the second quarter of 1979 instead of in late 1978, a slip of from four to six months.

We are now beginning intensive development of the Shuttle, and it is important that we be able to maintain a firm schedule through to completion. This is necessary for good management of the Shuttle effort and for scheduling the advanced payloads the Shuttle will launch and service. The OMB agrees with us on this.

In view of the increases in total NASA funding now agreed upon with OMB for FY 1976 and projected for future years, I am confident that we can avoid any further slips in the Shuttle schedule and that we can also maintain continuity and balance in other NASA programs as previously planned.

Shuttle development is proceeding well, and I foresee no new schedule changes for any reason, technological or budgetary.

Our R&D budget for aeronautics will be maintained at about the current rate (down by less than $2 million from FY 1974, up by $16 million compared with FY 1973). We will start several new projects in aeronautics. For example, we will begin a new cooperative program with the Department of Defense to increase the maneuverability of military aircraft. And we will continue a broad variety of programs to develop and demonstrate the technology which can improve the fuel economy, reduce the noise, and improve the performance of American-built civil transport aircraft, thereby helping maintain the U.S. competitive position in an area that is vitally important to our balance of trade.

Three new flight missions are proposed in our new budget. Two Pioneer spacecraft will be sent to Venus in 1978. Two new experimental applications satellites, Seasat-A and a Heat Capacity Mapping Mission satellite already nicknamed Heatsat, will be launched in 1978 and 1977, respectively. Both should lead to substantial economic benefits.

The High Energy Astronomical Observatory program that was postponed last year is back on the track. HEAO spacecraft will be launched to Earth orbit in 1977, 1978, and 1979.

We also plan to build the world's first large infrared telescope facility to support our planetary and astronomy programs. It will be located on a 14,000-foot mountain in Hawaii, and we hope to have it in operation before the Mariner spacecraft are launched to Jupiter and Saturn in 1977.

We will continue preliminary work on the establishment of a new Tracking and Data Relay Satellite System (TDRSS) to enable us to cut back on the number of ground stations we now maintain, especially overseas, and to help us prepare for the increased traffic of the Space Shuttle era. This is not yet an approved program, but we would like to see it in operation by 1979. I should also point out that NASA will not own the satellites in this system, but will lease them from private industry.

On the Space Tug, or Orbit to Orbit Stage (OOS), we have tentative agreement with the Department of Defense that they will plan to modify an existing upper stage for use during the early 1980s when the Air Force and NASA make the transition from expendable launch vehicles to the Shuttle. NASA will continue planning for later development of a more versatile fully reusable Space Tug that will be capable of satellite recovery from synchronous orbit and could be available by the mid-1980s.

I was asked by a reporter at the budget press briefing on February 2 how we managed to hold so closely to our original plans for this decade despite inflation and budget cuts in recent years. I attributed our ability to do so to our cost-control program and innovative management approaches to problems. George Low supplied a good example. He explained how, in planning our new Pioneer Venus program, we found we could actually save money by using a more powerful launch vehicle (Atlas/Centaur instead of Delta). While it costs more for an Atlas/Centaur launch, substantial payload savings can be achieved by relaxing spacecraft weight and size constraints.

I consider it a most important part of our overall mission as an R&D agency of the American people to seek to balance the adverse effects of general inflation with increased productivity and reduced costs.

The pressure is still on us to do more for less. This pressure is part of our job, part of our professional life. It is very much in the national interest that we continue to respond effectively to such pressure.

I was also asked at the press briefing if NASA "had made a pitch" for a share of the R&D funds the President is requesting to help meet the energy shortage. We did not, but we do expect some important assignments in our special fields

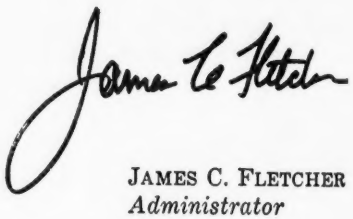
from the agencies that have primary responsibility for energy R&D programs and funds in FY 1975.

I know you will be glad to learn that the long decline in NASA personnel strength that began in FY 1968 is about to end. If our new budget is approved by Congress, Headquarters and all Centers except Marshall will have the same personnel ceilings for FY 1975 as were set for the current fiscal year which ends June 30. Marshall will lose an additional 354 positions in FY 1975 because of the completion of Skylab flights, but will remain the Center with the largest Civil Service work force.

As you know, we are giving special emphasis throughout NASA to increasing employment opportunities for members of minority groups and women. As I said at the budget press briefing, "The specific goals and timetables we have set are tough, but I believe that with a stabilized work force they are attainable and they will be met." In addition to increasing the number of minority group members and women in our work force, we want to encourage and facilitate their movement into NASA's professional ranks.

To sum up our prospects in the light of the FY 1975 budget, I would say that we have ample opportunities, and ample challenges, to maintain the strong, even-paced, balanced, and increasingly rewarding civilian space programs and aeronautics programs that our country needs at this time.

Sincerely,



JAMES C. FLETCHER
Administrator

THREE NEW STARTS IN FY 1975 PROPOSED

NASA's budget for FY 1975 calls for new starts on three flight missions, as follows:

1. *Pioneer Venus:* Two Pioneer spacecraft launched by Atlas/Centaur rockets will fly to Venus in 1978. One will send entry probes into the Venus atmosphere at four different locations to measure its composition and global dynamics. These probes will be designed to survive until they reach the surface, but not on the surface. The second spacecraft will orbit Venus to study the characteristics of the atmosphere and their temporal changes.

This is a project which has had a top scientific priority as the next new step in planetary exploration. Detailed study of the composition and global dynamics of the atmosphere of Venus, which is 100 times denser than the Earth's, will give a better understanding both of Venus and of the forces that drive the Earth's atmosphere, meteorology, and climatology.

Data from Mariner 10, together with what has been learned from Mariner 2 in 1962 and Mariner 5 in 1967, the several Soviet Venus missions, and ground-based observations, provide the scientific base for the comprehensive experiments Pioneer Venus will carry out in 1978.

2. *Seasat* will be an experimental applications satellite to observe and measure physical characteristics of the oceans, both to develop a scientific understanding of ocean dynamics and to determine the feasibility of developing an ocean dynamics forecasting system which could be of great economic value to the shipping and fishing industries.

Seasat-A will be launched in 1978 to monitor the world's oceans by measuring sea state, wave height, wind speed, ocean temperatures, and other characteristics. This will provide useful data for ship routing, ship design, storm damage avoidance, coastal protection, and deep water port development.

In this program, NASA is working closely with the other Government agencies directly concerned with the oceans—the National Oceanic and Atmospheric Administration (NOAA), the Coast Guard, and the Navy.

3. *Heat Capacity Mapping Mission (HCMM):* This will be another experimental applications project. It will use a small "Explorer-type" satellite to make thermal measurements of the Earth's surface. These measurements will be used to identify favorable locations for further ground inves-

tigations which will determine the ability to discriminate between rock types and rock structures. This discrimination can be of major value in locating mineral resources and in the construction of major civil works, such as highways and canals.

The measurements will also be used to investigate the feasibility of locating geothermal sources by remote mapping from a spacecraft. These sources, in the form of hot gases, liquids, or rocks, can potentially contribute to our nation's energy requirements. The HCMM will be launched on a Scout launch vehicle in 1977. The Department of the Interior is working with NASA on this project.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BUDGET PLAN SUMMARY

Obligational Authority	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
Research and development	2,488,475	2,305,000	2,346,015
Construction of facilities	78,725	101,100	151,490
Research and program management	721,783	744,786[a]	749,624
TOTAL BUDGET PLAN	3,288,983	3,150,886	3,247,129
Adjustments:			
Transfers to other agencies	15	---	---
Unobligated balances lapsing	7,652	---	---
FY 1973 funds applied to FY 1974 program	111,000	-111,000	---
TOTAL APPROPRIATIONS (New obligational authority)	3,407,650	3,039,886[a]	3,247,129
Outlay:			
OUTLAYS	3,315,163	3,179,200	3,274,900
Less offsetting receipts	-4,163	-1,900	-2,400
NET OUTLAYS	3,311,000	3,177,300	3,272,500

a/ Includes $37,786,000 proposed supplemental for civilian pay raises.

RESEARCH AND DEVELOPMENT PROGRAMS

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
MANNED SPACE FLIGHT	1,135,775	1,056,500	1,124,800
Space shuttle	198,575	475,000	800,000
Space flight operations	879,000	580,000	323,300
Advanced missions	1,500	1,500	1,500
Apollo	56,700	---	---
SPACE SCIENCE	679,169	602,000	547,015
Physics and astronomy	126,200	94,000	140,515
Lunar and planetary exploration	331,969	333,000	266,000
Launch vehicle procurement	221,000	175,000	140,500
APPLICATIONS	188,700	161,000	177,500
Space applications	188,700	161,000	177,500
AERONAUTICS AND SPACE TECHNOLOGY	232,500	237,000	241,200
Aeronautical research and technology	150,640	168,000	166,400
Space and nuclear research and technology	81,860	69,000	74,800
TRACKING AND DATA ACQUISITION	248,331	244,000	250,000
TECHNOLOGY UTILIZATION	4,000	4,500	5,500
TOTAL	2,488,475	2,305,000	2,346,015

MANNED SPACE FLIGHT

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
SPACE SHUTTLE	198,575	475,000	800,000
Orbiter	139,480	355,000	647,500
Main engine	40,543	79,000	92,300
Solid rocket boosters	---	18,100	22,600
External tanks	---	20,300	26,000
Launch and landing	---	2,600	11,600
Technology and related development	18,552	---	---
SPACE FLIGHT OPERATIONS	879,000	580,000	323,300
Apollo Soyuz Test Project	38,500	90,000	114,600
Development, test, and mission operations	294,000	220,200	175,200
Space life sciences	23,500	21,000	18,000
Mission systems and integration	21,000	15,500	15,500
Skylab	502,000	233,300	---
ADVANCED MISSIONS	1,500	1,500	1,500
Advanced mission studies	1,500	1,500	1,500
APOLLO	56,700	---	---
TOTAL, MANNED SPACE FLIGHT	1,135,775	1,056,500	1,124,800

SPACE SCIENCE

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
PHYSICS AND ASTRONOMY	126,200	94,000	140,515
Solar observatories	20,420	10,663	7,630
Astronomical observatories	5,700	2,426	2,380
High energy astronomy observatories	21,815	5,000	40,400
Orbiting explorers	33,158	32,850	33,000
Sounding rockets	20,000	19,350	20,000
Airborne research	4,100	4,000	4,000
Balloon program	1,000	1,000	1,000
Supporting research and technology	14,819	13,330	15,905
Data analysis	4,880	4,881	6,500
Spacelab experiment definition	308	500	3,500
Large space telescope - advanced technology development	---	---	6,200
LUNAR AND PLANETARY EXPLORATION	331,969	333,000	266,000
Mariner-Mars 1971	7,176	---	---
Mariner-Venus/Mercury 1973	30,507	11,115	4,119
Viking	232,249	224,655	89,016
Outer planets missions (MJS 1977)	6,064	30,610	69,761
Pioneer 6-11	9,308	5,870	5,000
Pioneer Venus	---	---	27,100
Helios	2,265	1,500	1,400
Supporting research and technology/ advanced studies	19,364	15,018	17,800
Planetary astronomy	4,800	4,200	4,200
Data analysis	3,036	9,251	10,473
Planetary quarantine	2,200	1,500	1,500
Planetary flight support	15,000	22,000	25,500
Lunar sample analysis	---	5,667	5,798
Lunar science operations	---	1,614	4,333
LAUNCH VEHICLE PROCUREMENT	221,000	175,000	140,500
Scout	15,700	8,300	13,800
Centaur	120,700	112,200	75,000
Delta	76,000	50,500	47,700
Titan III C	5,500	---	---
Supporting research and technology	3,100	4,000	4,000
TOTAL, SPACE SCIENCE	679,169	602,000	547,015

APPLICATIONS

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
SPACE APPLICATIONS:			
Weather and Climate	60,345	51,100	35,000
All weather atmospheric soundings experiment satellites (Nimbus 5 & F)	28,800	16,400	7,000
Operational temperature sounding satellite (TIROS-N)	4,250	10,000	9,000
Synchronous meteorological satellites (SMS A-B)	16,700	10,000	1,400
Operational satellite improvements	1,755	2,500	3,500
Global atmospheric research program (GARP)	3,240	5,700	7,400
Meteorological soundings	1,200	1,500	1,700
Advanced techniques in observing and forecasting	4,400	5,000	5,000
Pollution Monitoring	2,300	11,800	29,800
Oceanographic and air pollution observation satellite (Nimbus G)	---	9,000	27,000
Sensor definition and feasibility evaluations	2,300	2,800	2,800
Earth Resources Survey	55,155	47,400	58,600
Earth resources technology satellites (ERTS)	32,600	16,400	11,100
Multispectral scanner - 5th band development	---	1,000	4,000
Earth observations aircraft program	13,000	16,800	17,300
Earth resources experiment package investigations	---	---	3,800
Data interpretation techniques, special investigations and data analyses	9,555	13,200	22,400
Earth and Ocean Physics	7,200	10,400	18,500
GEOS 1 and 2	1,145	---	---
Geodynamic experimental ocean satellite (GEOS-C)	4,196	3,400	900
Laser geodynamic satellite (LAGEOS)	---	1,300	2,300
Experiment data analysis	---	2,700	2,700
Measurement systems, forecasting techniques and modeling	1,859	3,000	2,600
Ocean dynamics satellite (SEASAT-A)	---	---	8,000
Tectonic plate motion	---	---	2,000
Space Processing	---	3,000	3,500
Energy Applications	---	2,000	2,000
Communications	58,106	22,100	8,300
ATS 1-5 operations and data analysis	1,333	---	---
Multi-user communications experiment satellite (ATS-F)	51,854	16,000	---
Cooperative applications satellite (CAS-A)	46	---	---
Canadian cooperative satellite (CAS-C)	2,686	2,760	1,550
Experiments coordination and operations support	---	800	3,700
Traffic management studies	154	---	---
Systems technology and techniques	2,033	---	---
Technical consultation and support studies	---	2,540	1,650
Advanced communications research	---	---	1,400
Earth Observatory Satellite (EOS) - Definition Studies	900	3,000	1,000
Data Management	---	---	4,000
Shuttle Experiment Definition	---	4,500	4,500
Advanced Applications Flight Experiments (AAFE)	4,694	4,700	4,700
Applications Systems Analysis	---	1,000	5,000
Applications Explorers: Heat Capacity Mapping Mission	---	---	2,600
TOTAL, SPACE APPLICATIONS	188,700	161,000	177,500

AERONAUTICS AND SPACE TECHNOLOGY

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
AERONAUTICAL RESEARCH AND TECHNOLOGY	150,640	168,000	166,400
Research and technology base	74,803	81,426	83,900
Systems and design studies	5,486	6,073	5,000
Systems and experimental programs	(70,351)	(80,501)	(77,500)
Advanced systems technology	---	---	3,500
Systems technology programs	11,700	22,000	17,200
Experimental propulsion programs	26,817	25,000	11,500
Flight experiments	14,593	9,280	13,650
Research/experimental vehicles programs	6,219	10,611	19,900
Operating systems experiments	11,022	13,610	11,750
SPACE AND NUCLEAR RESEARCH AND TECHNOLOGY	81,860	69,000	74,800
Research and technology base	55,510	60,907	61,500
Systems and design studies	1,230	1,300	1,600
Systems and experimental programs	8,020	3,693	6,700
Low cost systems program	---	3,100	5,000
Nuclear power and propulsion program	17,100	---	---
TOTAL, AERONAUTICS AND SPACE TECHNOLOGY	232,500	237,000	241,200
NOTE: Amounts included in the FY 1974 and FY 1975 Budget Plan for nuclear efforts under Space and Nuclear Research and Technology	---	7,000	7,000

TRACKING AND DATA ACQUISITION

BUDGET PLAN

	(Thousands of Dollars) FY 1973	FY 1974	FY 1975
TRACKING AND DATA ACQUISITION	248,331	244,000	250,000
Operations	194,701	195,200	192,800
Systems implementation	45,130	39,600	48,000
Supporting research and technology	8,500	9,200	9,200

TECHNOLOGY UTILIZATION

TECHNOLOGY UTILIZATION	4,000	4,500	5,500

FISCAL YEAR 1975 CONSTRUCTION OF FACILITIES PROGRAM

BUDGET PLAN

PROJECTS BY INSTALLATION	(Thousands of Dollars)
Ames Research Center	
Addition to flight and guidance simulation laboratory	3,660
Goddard Space Flight Center	2,110
Rehabilitation and modification of science and application laboratories	890
Modifications for fire protection and safety	1,220
Jet Propulsion Laboratory	8,820
Acquisition of land	150
Addition to systems development laboratory	4,880
Addition for integrated systems testing facility	3,790
Johnson Space Center	
Modification of water supply system	935
Langley Research Center	3,505
Modification of 6,000 p.s.i. air storage system	515
Rehabilitation of 16-foot transonic wind tunnel	2,990
Lewis Research Center	3,240
Modification of propulsion systems laboratory	2,580
Modification of rocket engine test facility	660
Marshall Space Flight Center	
Construction of X-ray telescope facility	4,060
Wallops Station	
Modification of beach protection system	1,370
Various Locations	112,890
Construction of infrared telescope facility, undesignated location	6,040
Modifications for fire protection and safety at various tracking and data stations	1,430
Space Shuttle facilities at various locations	86,020
Launch and landing facilities	71,950
Construction of Orbiter landing facilities, John F. Kennedy Space Center	15,880
Construction of Orbiter processing facility, John F. Kennedy Space Center	13,380
Modifications to launch complex 39, John F. Kennedy Space Center	42,690
Ground Test facilities	7,480
Modifications for dynamic test facilities, Marshall Space Flight Center and NASA Industrial Plant, Downey, Calif.	3,920
Construction of Orbiter horizontal flight test facilities, Flight Research Center	1,940
Modifications for crew training facilities, Lyndon B. Johnson Space Center	420
Modification of the vibration and acoustic test facility, Lyndon B. Johnson Space Center	410
Construction of materials test facility, White Sands Test Facility	790
Solid rocket booster production and test facilities	6,590
Modifications for solid rocket booster structural test facilities, Marshall Space Flight Center	2,590
Construction/modification of solid rocket motor production and test facilities, undesignated locations	4,000
Minor rehabilitation and modification of facilities at various locations, not in excess of $500,000 per project.	14,900
Minor construction of new facilities and additions to existing facilities at various locations, not in excess of $250,000 per project	4,500
Facility planning and design not otherwise provided for	10,900
Total	151,490

RESEARCH AND PROGRAM MANAGEMENT

BUDGET PLAN

INSTITUTIONAL DIRECTOR AND INSTALLATION	(Thousands of dollars) FY 1973	FY 1974	FY 1975
MANNED SPACE FLIGHT	338,902	351,580	346,133
Johnson Space Center	110,600	116,860	118,179
John F. Kennedy Space Center, NASA	91,117	94,471	96,739
Marshall Space Flight Center	137,185	140,249	[illegible],215
SPACE SCIENCE	106,440	109,844	112,283
Goddard Space Flight Center	95,736	98,422	100,579
Wallops Station	10,704	11,422	11,704
AERONAUTICS AND SPACE TECHNOLOGY	214,874	219,814	223,875
Ames Research Center	42,365	45,950	47,956
Flight Research Center	11,593	12,094	12,492
Langley Research Center	78,597	82,389	84,989
Lewis Research Center	82,319	79,381	78,438
NASA HEADQUARTERS	61,567	63,548	67,333
TOTAL	721,783	744,786[a]	749,624

a/ Includes $37,786,000 proposed supplemental for civilian pay raises.

RESEARCH AND PROGRAM MANAGEMENT

TOTAL NUMBER OF PERMANENT POSITIONS

END OF YEAR

INSTITUTIONAL DIRECTOR AND INSTALLATION	FY 1973	FY 1974	FY 1975
MANNED SPACE FLIGHT	11,350	10,525	10,171
Johnson Space Center	3,727	3,652	3,652
John F. Kennedy Space Center, NASA	2,409	2,309	2,309
Marshall Space Flight Center	5,214	4,564	4,210
SPACE SCIENCE	4,403	4,228	4,228
Goddard Space Flight Center	3,966	3,808	3,808
Wallops Station	437	420	420
AERONAUTICS AND SPACE TECHNOLOGY	8,974	8,626	8,626
Ames Research Center	1,730	1,700	1,700
Flight Research Center	483	483	483
Langley Research Center	3,411	3,371	3,371
Lewis Research Center	3,350	3,072	3,072
NASA HEADQUARTERS	1,741	1,591	1,591
Planned unfilled positions	382	---	---
TOTAL	26,850	24,970	24,616

DR. NEWELL RETIRES

Dr. Homer E. Newell, Associate Administrator and an early member of the Headquarters staff, has retired from NASA, effective Dec. 31, 1973.

In announcing this action on the part of Dr. Newell, Dr. James C. Fletcher, NASA Administrator, made the following statement:

"He has served this agency with distinction and dedication and will be sorely missed. His efforts in the space program antedate the birth of NASA. He will continue temporarily with NASA to complete work in which he is directly involved. We wish him all the best in the future."

Dr. Newell transferred to the newly-organized space agency from the Naval Research Laboratory, where he was head of the Rocket Sonde Branch and acting superintendent of the Atmosphere and Astrophysics Division, in October, 1958. He was appointed to his present position in 1967. Prior to that, he served four years as Associate Administrator for Space Science and Applications.

He is the author of numerous scientific articles and seven books ranging from technical works to popular treatments of space science and rockets. He was chairman of a special committee of the Rocketry Panel for planning and organizing this country's IGY sounding rocket program at Fort Churchill in Canada, and is an invited participant on the Space Board of the National Research Council.

Member of a number of professional societies, he holds numerous awards, among them the President's Award for Distinguished Federal Civilian Service and NASA's Distinguished Service Award.

Companies in 47 states and the District of Columbia received more than $449 million in contracts from the Johnson Space Center during fiscal year 1973.

SCHMITT SPECIAL ASSISTANT

Dr. Harrison H. Schmitt of the Johnson Space Center, lunar module pilot on Apollo 17, has been assigned for a period of 90 days as Special Assistant to the Administrator to coordinate efforts of NASA in energy research and development.

In the position, he will provide a focal point for all of NASA's energy-related research and development, and will facilitate its support to other agencies which have been charged with the conduct of energy R&D.

Dr. Schmitt, a geologist and scientist-astronaut, is currently Chief of the Astronaut Office, Science and Applications Directorate, at JSC. He will be on temporary duty from this assignment while he serves as Special Assistant to the Administrator.

Before joining NASA, he was project chief for lunar field geological methods with the U.S. Geological Survey's Astrogeology Center in Flagstaff, AZ, and participated in photo and telescopic mapping of the Moon. He also instructed NASA astronauts during their geological field trips.

MOST MILES PER GALLON

In an article entitled "Detroit Turns Against the Gas Guzzlers," the January issue of Fortune Magazine points out that the current oil shortage will bring about improvements in the efficiency and economy of American automobiles. There will be less waste of energy, it predicts, and this will be made possible through smaller cars and more miles per gallon.

The magazine suggests a challenge thus is tossed to the aerodynamic engineer.

Technicians who made it possible for man to go to the Moon and who added such innovations to aviation as NASA's VTOL program and supercritical wing may also come up with answers to the fuel problem. Just recently—and Fortune makes note of this also—announcement was made that the Jet Propulson Laboratory had come up with a program based on hydrogen technology to reduce pollution from automobile engines.

As for reduced gas consumption, the magazine cites the Shell Mileage Marathon, a friendly contest that grew out of an argument over gas mileage between two engineers at the company's Wood River, IL, research plant. Last year's winner got 376.6 miles per gallon out of his Opel.

But the winning machine had undergone drastic changes. Of the original automobile, only the engine and parts of the body still remained. It had been reduced in height by five inches to lower wind resistance. Its frame was rigid, with solid axles attached directly to it. It rolled on aircraft tires inflated to 200 pounds per square inch. The engine was swathed in insulation to retain heat. The rear wheels, set next to each other inside the frame, were driven by a chain.

"These transformed cars," the Fortune article admits, "are fragile and unreliable, and they cannot go very far or very fast. But the extreme modifications are extensions of principles that underlie many efforts to increase the economy of conventional automobiles."

COMMUNITY INVOLVEMENT PROGRAM

During the last three or four years, according to Dr. William B. Rich, Associate Director of Educational Programs, NASA has received a number of requests from educational and civic leaders to visit their communities and join with them in conducting programs about America's space program. Every effort is made to accept and fulfill these invitations, he said.

"Originally conceived in strictly educational terms, the programs have appealed to adults, who not only have attended the events connected with them, but also have contributed their services as speakers and committee members," Dr. Rich, whose duties include responsibility for the Community Involvement Program, added. The term NASA uses to describe this activity is Aerospace Educational Community Involvement Program.

Each project under the program is directed by the community itself. The following already have been scheduled for this year:

Indiana—Indianapolis, April 22-May 3.

Iowa—Des Moines, April 22-May 10.

Minnesota—Robbinsdale, Feb. 18-March 8.

Mississippi—Jackson, Feb. 19-March 8.

New Jersey—Lawrence Township (Mercer County, NY, and Bucks County, Pa.), March 27-April 3.

New York—Herkimer, Jan. 1-18.

Oklahoma—Oklahoma City, Jan. 7-25.

Pennsylvania—Reading, April 17-26.

These community programs range in length and breadth from two or three days centered in a group of schools to longer and broader-scaled programs which involve many segments of the community. They may include workshops for teachers, participation in civic and service club luncheons and dinner meetings, radio and TV presentations, and various community gatherings.

Services supplied by NASA include consultation in planning, conduct of Spacemobile lecture-demonstrations and classroom activities, speeches by NASA scientists and astronauts, exhibits of space hardware and lunar rocks, and providing educational literature for teacher workshop groups. The subject matter ranges from information on developments and achievements in such programs as Skylab, Space Shuttle, the Earth Resources Technology and Applications Technology Satellites, to planetary missions, such as Mariner-Venus-Mercury, Pioneer-Jupiter, and Viking, and to the various astronomy and scientific satellites.

"We feel privileged to serve America's schools and communities in their efforts to become informed about NASA activities and their results," Dr. Rich said. "NASA is fortunate to have the resources to provide this educational service."

He added that the service is an implementation of the provisions of the Space Act of 1958, which requires NASA to inform the public of the activities of the space program and the results thereof.

DEL RIEGO JOINS NASA

Joseph Del Riego, a staff member of the Committee on Science and Astronautics of the House of Representatives since 1971, has been appointed Director of the Congressional Liaison Division of NASA's Office of Legislative Affairs.

In his new post, he will be responsible for all activities of the Liaison Division and will direct coordination of the three divisions within the Office of Legislative Affairs.

A native of Mexico City, Mexico, Del Riego, before serving with the House committee staff, was employed by ITT Intelcom, Hughes Aircraft Co., Mechanics Research, and Litton Industries.

HANDICAPPED MAN FOUNDS COMPANY TO AID DISABLED

Praises NASA for Granting His First Contract under SBA 8(a) Program

A 26-year-old, four-foot-eight-inch man who divides his time between half sitting, half standing in a wheelchair and reclining in a hospital bed sits in an office on the Virginia side of Washington and speaks in high terms of NASA for granting him his first SBA 8(a) contract, thus opening the way for him to stand out as an expanding success in the business world.

His praise for the space agency is voiced at the same time he seeks contracts from other government agencies and from commercial companies, for his goals in life are (1) to perform satisfactory and (2) to locate employment for the disabled. At the moment, he has a large backlog of orders on hand, but he is looking for more—for there are between four and five million physically handicapped persons in America, he often reminds the listener, and a large number of these can be trained to become useful, productive individuals.

This quite unusual individual is Surinder Dhillon, president of Rehab Computer, Inc. He is not only a computer systems analyst, but also an expert in the art of programming. Physically a cripple, his mind is sharp and active, and works in a manner sharply in contrast to his enforced physical immobility.

Dhillon is a living paragon of self-motivation, of the ultimate in willpower and determination. Even before reaching manhood, he had assumed the attitude of a person who could not be defeated, of the sainted few who can rise from the floor after a count of nine.

The most amazing and tragic part of his life has happened within the last 10 years. Born in Simla, India, he came to this country in 1964 at the age of 16 with his mother, who was in the Indian Foreign Service. His first stop was Washington, DC. He could speak fluent English, so he set his cap on obtaining a good education from American schools. At the time, he was bothered by juvenile arthritis, but not crippled by it.

Then the unexpected happened. While on a trip over the Pennsylvania Turnpike, he was badly injured in an automobile accident. During the next four or five years, during which the arthritis was aggravated by the mishap and caused him to become crippled in every joint, he was confined to hospitals and rehabilitation centers.

Finally, after numerous operations and long periods of treatment, the doctors told him he should go to a long-term care facility, that they could do no more for him. He was confined to a bed bent in the middle at a 30-degree angle, and they informed him they could no nothing that would enable him to sit upright.

Refused Life of Inactivity

But Dhillon was in no mood to accept a life of inactivity. He didn't want a handout; he wanted to work. While in the hospital he had taught himself about electronics and about computers. Although his weight was far below what it had been, and his stature had been shortened by at least a foot, his willpower was too strong for him to be bothered by these changes.

After leaving the hospital, he designed and had built an electric-powered wheelchair that would enable him to sit up and to move about—as he says, "made it so I could go out in society."

A charitable organization dedicated to the handicapped gave him a job that paid him 25 cents an hour while he was learning to fix things. (This training was, in turn, being paid for by the Department of Vocational Rehabilitation.) But he was not happy with his surroundings. The disabled doing this work, for instance, were relegated to the basement where there was no air-conditioning, while the offices above, in which sat the people who ran the operation and who were not afflicted, were equipped for comfort in all sorts of weather.

So he soon enrolled in a special class at George Washington University—the Homebound Employment Project (HEP), it was called—and began learning how to program and do computer work. For three years he pursued this course, contributing to the instruction himself and winding up with a diploma Certificate of Completion. Even then, he continued to study. He estimates he has taught himself 95 percent of what he knows.

The immediate problem after leaving George Washington University was finding a job. Transportation became the snag. When he went out for a work interview, he found the cost for conveying a handicapped person was $25 each way. Three such trips he made, without success, and then realized he could not afford more of them.

Still determined to succeed on his own, he took another channel: he had a telephone installed so

Surinder Dhillon

he could call prospective employers at random. For a year and a half he pursued this course, sustaining himself in the meantime by working as a consultant operating out of his home.

He estimates he had made 300 to 400 calls before someone steered him toward COMSAT, the commercial undertaking in global communications that has resulted from direct application of NASA's pioneer research and development in this field.

COMSAT Pleased with Work

COMSAT gave him some trial work that he could do at home. He did it so well he was placed on the payroll as a consultant.

But Dhillon's mind was working far beyond this pace. In 1970, with two other handicapped men, he started Rehab Transportation, Inc., a company devoted basically to transporting disabled individuals wherever they wanted to go. It was headquartered at Rockville, MD. Today he is vice-president and still a stockholder in this company, but he takes no active part in its operation.

His venture into transportation did so well that he soon started another business—the Microfilming Service Bureau—also based in Maryland. This, too, prospered and is still operating, although he has withdrawn from it.

His next step was to organize Rehab Computer, Inc. After a year of existence, the firm decided to qualify for contracts under the SBA 8(a) Program, provisions of which permit a government agency to contract directly with the Small Business Administration, which in turn subcontracts with selected firms (owned/operated by socially and economically disadvantaged persons) for required services and supplies. The new business was slow to get off the ground.

"For a year and a half," he relates, "we had the company and nothing else. Now, with SBA 8(a) certification promised when a government contract was located, I made numerous calls—to EPA, the Justice Department and other government agencies—but they all turned me down."

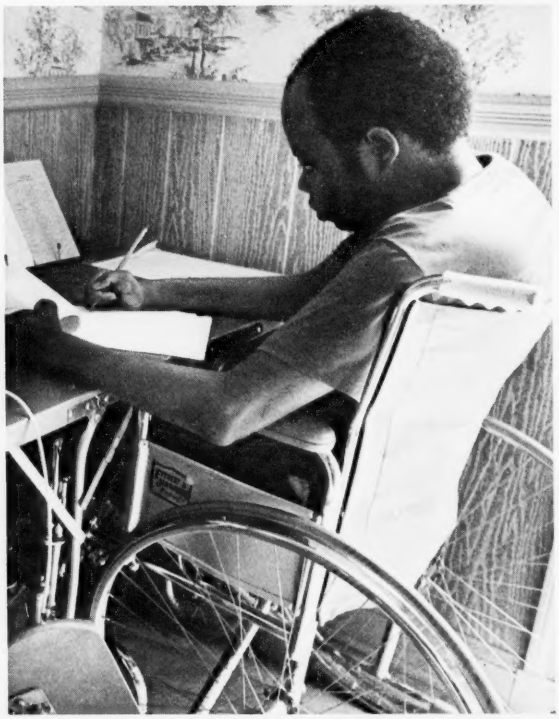
Then came a call from Dennis Giblin, Project Technical Officer at NASA. It was made in April, 1973, and it was to inform Dhillon that he had a requirement to design and implement a program to augment the System Management Facility (SMF) at Goddard Space Flight Center. An $8,900 contract followed, and 12 weeks went into the work. It was done so well NASA wrote him a letter expressing its satisfaction.

Door had Opened

For Dhillon, the door had opened at last. Since then, other contracts have come his way—from NASA and from additional agencies and companies which had learned of the good work Rehab Computer, Inc., could do.

As of Dec. 31, 1973, Dhillon's company has compiled contracts totaling $190,000, in addition to the NASA job. All but $20,000 of these contracts were made available under the SBA 8(a) Program.

As soon as Dhillon managed to get the NASA contract, he began training other handicapped persons for employment with his company, some of them to work from their homes by using remote terminals because of their severe disability. He now employs 14, each a conscientious and highly-trained computer technologist. Some of those he trains remain with him, while others are grabbed up by outside companies, a development he does not discourage because of his goal of helping the afflicted. He himself has received remunerative offers to go with other companies, but he prefers



TRAINEE AT WORK—Rehab Computer, Inc., employs the handicapped without regard to sex, race, creed, or natural origin.

to remain where he can help the handicapped.

During December, he moved Rehab Computer, Inc., into its present headquarters, occupying 800 square feet of office space. The training is done in a separate building—in 1,700 square feet of space in nearby Falls Church.

With Dhillon, training gets first attention. He looks about for the hard-core physically disabled and other disabled persons, for he has faith that anyone can become a producer if properly trained. He knows that, while they are physically handicapped, their minds are sharper than average, for they develop compensating factors to offset their disability.

"It's a wonderful thing to watch happen," comments John S. H. Carter, Senior Associate and Project Director of Rehab Computer, Inc., "to see people who have spent years on welfare discover that they can become productive members of society despite a handicap."

The mind of Dhillon, a man who sits quietly in a wheelchair when not lying prone in bed, is constantly working, sharply alert. He has amassed a wide reputation as a systems analyst. And he designs highly technical programs and systems—COMSAT has bought several which are in use all over the country.

"But my greatest satisfaction comes from training and helping others," he says with spirit. "The success of Rehab Computer, Inc., rests upon the shoulders of all of us. The other people in the company know what I am doing, what I can do, and that has a lot to do with making the company productive."

Use of Kennedy Space Center spacecraft checkout equipment to process Earth resources data recorded aboard Skylab, it is estimated, has saved NASA at least $100,000.

Operated by the same computer programmers, technicians and operators who used it to view data from Apollo missions and for Skylab Earth Resources Experiment Package (EREP) prelaunch checkout operations, a Quick Look Data Station in KSC's Manned Spacecraft Operations Building is now performing a data reduction function vital to the EREP program. Had this not been available, the computer programs necessary to perform the task involved would have cost about $100,000.

REDUCING OIL SPILLS

Hazard-analysis and quality control techniques developed by NASA to send men to the Moon and return them safely to Earth are helping to make delivery of oil from offshore wells safer and more efficient, a prospect that is equally pleasing to oil producers and environmentalists.

To reduce the chances of accidental oil spills and ecological damage to shore areas and the outer continental shelf, NASA personnel from the Marshall Space Flight Center and its Mississippi Test Facility and Michoud Assembly Facility assisted the U.S. Geological Survey in seeking ways to improve reliability of safety and anti-pollution equipment used in offshore oil production operations.

As a result of the NASA study team's recommendations, at the request of the USGS, the American Petroleum Institute, representing the oil industry, has developed and is testing improved performance specifications for subsurface safety valves used in oil well casings.

In making its study, the Marshall Center team brought to bear its extensive experience in applying quality control and hazard-analysis procedures used in the Apollo program.

ENERGY ARTICLES TO COME

The March issue of NASA ACTIVITIES will contain two articles on the energy crisis. One will review steps taken at NASA centers to cooperate in the nationwide effort to save energy. The other will describe NASA's efforts to develop (1) new ways of using fossil fuels more efficiently and (2) new fuels and sources of energy to replace fossil fuels.

ASTP WORKING GROUPS MEET

Three Apollo-Soyuz Test Project working groups began technical meetings at the Johnson Space Center on Jan. 14 in the areas of mission plans and experiments, communications and tracking, and life support and crew transfer.

Thirty-five Soviet engineers and specialists will work at JSC for periods ranging from 16 to 90

days. The nine members of the communications and tracking working group who will spend three months at the Center will take part in extensive compatibility testing of the radio and cable communications systems for the Soviet and American spacecraft.

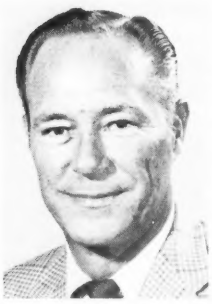
The meetings are part of a continuing exchange of working groups between the U.S. and USSR in preparation for the joint manned earth-orbital mission scheduled for July, 1975, to test compatible rendezvous and docking systems and techniques.

Project technical directors are expected to meet again at JSC in March. Their last meeting was held in Moscow last October.

DR. HANS GRUENE RETIRES

Dr. Hans F. Gruene, Director of Launch Vehicle Operations at Kennedy Space Center and active in the American space program for the last 28 years, has retired.

He came to Cape Canaveral initially in 1952 with Dr. Kurt H. Debus, present Center Director, and they were the first two employees of the organization that later was named Kennedy Space Center. He helped establish launch sites for the Joint Long Range Proving Ground, later the Eastern Test Range.



Born in Germany in 1910, Dr. Gruene, an electrical engineer, began working on the German guided missile program at the Peenemunde Guided Missile Center in 1943. After the war, he came to the U.S. with a group headed by Dr. Wernher von Braun, who retired in 1972 as Deputy Associate Administrator of NASA, and served as a guided missile design engineer at the Army's Ordnance Research and Development facility at Fort Bliss, TX. One of his first assignments was to help launch captured Germany V2 rockets from the White House Sands Proving Grounds in New Mexico.

In August, 1964, he was appointed to his present position and has been responsible for preflight testing, preparation and launching of Saturn rockets.

SOLAR TEST AT MSFC

Engineers at the Marshall Space Flight Center will use sunshine later this year to heat and cool three house trailers parked together to simulate a residence.

They will demonstrate a system that will take from the Sun three-fourths of the thermal energy needed for the simulated living quarters.

The system is designed to furnish three tons of air conditioning in the summer and 20.5 kilowatts (70,000 BTU per hour) of heat during the winter.

The experimental system can provide this through three cloudy days with surplus energy in storage for operation at night and on days when cloudy skies block the sunlight. It should be in operation by June.

The system would greatly reduce the demand on a conventional heating-cooling system, but would not replace it. A conventional system would still be needed to make up for the undercapacity and to provide energy during extended cloudy periods.

Overall management of the project is by the Program Development Directorate at the Marshall Center. It is being carried out by the Science and Engineering Directorate with Astronautics Laboratory in the lead.

The unit is being erected in a parking lot near the Astronautics Laboratory.

CORRECTION

The name of the new Low Cost Systems Office at NASA Headquarters appeared incorrectly on Page 3 of the January issue of NASA ACTIVITIES. For a report on the establishment of this new office, see the December issue of this publication, Page 241.

MSFC'S TOP SECRETARY

Lorena Neisler, secretary in the office of the MSFC Deputy Director, has been selected as "Secretary of the Year" by the MSFC-Redstone Chapter of the National Secretaries Association.

Mrs. Neisler was chosen for the award on the basis of her background experience, special training, business experience, and NSA activities. She has been a secretary at MSFC since 1960.

She also has received two Sustained Superior Performance Ratings and an Outstanding Performance Award.

GALILEO II AT ARC—The arrival of this plane to replace the Galileo I lost in a crash last year was followed by announcement of a scholarship fund set up as a memorial to the victims of the mishap.

GALILEO MEMORIAL SCHOLARSHIP

A scholarship in memory of the men who perished in the crash of the original Galileo aircraft on April 12, 1973, has been established by Ames Research Center and the San Francisco Section of the American Institute of Aeronautics and Astronautics.

Announcement of the scholarship followed the arrival at ARC in December of the Galileo II, a Convair 990 aircraft to be used, as in the case of its predecessor, as an airborne laboratory. A brief ceremony, conducted at that time by Deputy Director C. A. Syvertson, was held to dedicate the plane to the memory of those who died in the crash.

Under the provisions of the Galileo Memorial Scholarship Program, $500 will be awarded annually to a high school senior seeking a career in engineering or science.

The program will be financed by funds contributed by the NASA Ames Exchange Council and from a trust fund established by the AIAA San Francisco Section. Tax deductible contributions to the fund may be sent to: AIAA/ARC Galileo Scholarship Fund, P.O. Box 1548, Mountain View,

FUEL REDUCES KSC VISITORS

More than 1,500,000 persons visited Kennedy Space Center during 1973, the eighth year in which the public has been admitted on a daily basis, but the figure would have been much higher had not the fuel crisis interfered.

Trans World Airlines, which operates the Visitors Information Center and employs Florida Parlor Coach Co., Inc., a Greyhound subsidiary, to provide buses and escorts for the daily 50-mile tours, reported that 1,264,321 patrons boarded buses during the year, a total nine per cent under the record attendance of 1972. About 20 per cent of the visitors do not take the tour.

The impact of the fuel shortage became apparent in December, normally the peak month. During the second half of the month, boardings of tour buses declined almost 40 per cent under the previous year.

PATENT CONFERENCE SCHEDULED

A conference to explain the liberalized patent licensing procedures authorized for NASA by the President in 1972 will be held at Jacksonville, FL, March 14. The one-day session, third in a series, will be open to all interested U.S. business persons.

Topics to be covered during the conference include a review of the patent licensing program, under which NASA may now grant exclusive licenses in appropriate cases as early as nine months after an invention has been announced; how NASA field center patent counsels can help business; the role played by NASA regional information dissemination centers, and examples of technology transfer to the business community.

The $20 registration fee includes a copy of the NASA Patent Abstracts Bibliography, which lists all patents available for licensing, as well as a custom search of the patent file in each participant's specific field of interest to identify possible patent licensing opportunities.

The meeting is being arranged by the North Carolina Science and Technology Research Center, Research Triangle Park, NC, part of an information dissemination network jointly sponsored by NASA and the State of North Carolina.

KEEPING TAB ON ENERGY EXPENDITURE—Dr. George Traugh of the University of Alabama Medical School's Spain Rehabilitation Center is pictured as he monitors a patient's energy expenditure on a new medical device developed from space technology.

MEASURING ENERGY

The Marshall Space Flight Center has used technology derived from the Apollo and Skylab programs to produce a new medical device that will be used to measure the amount of energy expended by ambulatory patients.

Called a Mobile Automatic Metabolic Analyzer (MAMA), the instrument provides accurate measurements of metabolic activity of both normal and severely disabled subjects during actual working conditions. It will also be used to gauge the progress of severely disabled persons through the several phases of their rehabilitation training programs.

The unit was turned over Jan. 25 to the Spain Rehabilitation Center, University of Alabama Medical School, Birmingham, AL, where it will be evaluated.

MAMA utilizes a metabolic analyzer similar to the one developed for and used in the Skylab program. This and other instrumentation is mounted on a battery-powered cart, designed and fabricated using knowledge gained by the Marshall Center during the development of the Lunar Roving Vehicle.

The motorized car and instrumentation system will enable rehabilitaiton doctors and physical therapists to gather accurate workload information on ambulatory subjects. The instrumentation consists primarily of a mass spectrometer which provides a continuous record of the amount of oxygen consumed, the carbon dioxide produced, and the nitrogen and moisture exchanged. Additionally, inspiratory and expiratory volumes are recorded, as well as pulse rates and patient rate of speed.

MAMA was designed, developed and manufactured at the Marshall Center's Astrionics and Process Engineering Laboratories under NASA's Technology Utilization Program.

MOSSINGHOFF IN NEW POST

Gerald J. Mossinghoff, Deputy Assistant Administrator for Legislative Affairs, has been appointed Assistant General Counsel of NASA, effective Jan. 1, replacing Arthur D. Holzman, who retired Dec. 31.

In his new post, Mossinghoff will handle legal activities affecting NASA in the areas of legislation, energy and environment, tort claims, fiscal and personnel matters, and real estate. He also will serve as counsel to the Office of Legislative Affairs and report to R. Tenney Johnson, General Counsel of NASA.

Until a successor to him in his former post is named, he will continue to serve in that capacity.

Mossinghoff joined NASA in 1963 and became Director of the Infringement and Royalties Division, Office of General Counsel. In 1966, he was appointed Director of the Office of Legislative Planning, U.S. Patent Office, but returned to NASA the following year as Director of Legislative Liaison in the Office of Legislative Affairs.

KAPRYAN TO BE HONORED

Dr. Walter J. Kapryan, Director of Launch Operations at Kennedy Space Center, will be presented the "Gold Award" of the Affiliate Council of the Engineering Societies of Detroit at a banquet to be held in that city on Feb. 20 as a part of National Engineers Week.

The Affiliate Council, made up of 50 engineering societies in Greater Metropolitan Detroit, makes the award annually to the recipient selected as the outstanding engineer for the year from the Detroit area. Dr. Kapryan was reared there and is a graduate of the city's Wayne University.

At the banquet, he will be the featured speaker, using a topic based on this year's Engineers Week theme — "Engineering — Our Greatest Energy Source."

As Director of Launch Operations, he is responsible for the management and technical direction of preflight operations and integration, test, checkout and launch of all NASA space vehicles. Prior to assuming this post in 1969, he was Deputy Director of Launch Operations.

First employed by the National Advisory Committee for Aeronautics at Langley, he came to the Kennedy Space Center in 1960. During the early phases of the Gemini Program, he was responsible for test planning and determining requirements for spacecraft checkout equipment. In 1963, he established and headed the Gemini Program Office and has participated in the preparation and countdown of all 10 manned Gemini flights and the Apollo/Saturn IB and Saturn V missions.

MOBILE 'COUNTRY STORE'

A new mobile "country store" facility has gone into operation at Marshall Space Flight Center as a means of providing administrative and office supplies throughout the installation.

During the MSFC retrenchment program, several supply annexes, which normally provided the supplies, were closed. In order better to serve the supply needs of all of the Center, the Technical Materials Division initiated the country store concept.

"The overall retrenchment makes the country store more profitable," explained Louis Crouch, chief of TMD. "It will mean improved, direct service; a saving in the budget through reduced inventory; and reduced manpower for operation and supply management."

The country store is a van equipped with bins containing nearly 300 administrative supply items, the same available in the annexes.

FILM ACTIVITY

NASA has announced the release of a new motion picture entitled "MARS—THE SEARCH BEGINS." It was produced by JPL and runs 28½ minutes.

Two short educational films have also been released—"OUR SOLAR SYSTEM," 4¾ minutes, and "EARTH SUN RELATIONSHIP," 6¼ minutes.

A new NASA film list is available. It includes an updated listing of all NASA films that are available on free loan to the general public and prices of the films for sale through the National Audiovisual Center.

The NASA film, "THE MOON—AN EMERGING PLANET," won a prize in the Scientific category at the 26th Annual Salerno Short Length Film Festival, Salerno, Italy, held in December.

PETRONE AIAA FELLOW

Dr. Rocco A. Petrone, Director of the Marshall Space Flight Center, was honored Jan. 28 at the 1974 AIAA Fellows Dinner in Washington, DC. At that time he was formally inducted into the select community of Fellows of the American Institute of Aeronautics and Astronautics.

The current Fellows of the AIAA elected Dr. Petrone to its ranks in recognition of his "many outstanding contributions and acknowledged leadership in the professional aerospace community."

The honors were bestowed by Dr. Edgar M. Cortwright, Director of the Langley Research Center and Chairman of the Fellow Grade Committee of AIAA.

Dr. Petrone is one of only 19 men of science and engineering who were recognized as AIAA Fellows during the year. Fellows are dignitaries who meet the criteria of "persons of distinction who have made notable and valuable contributions to the arts, sciences, or technology of aeronautics and astronautics."

DRYDEN FELLOWSHIP WINNER

John W. Edwards, an aerospace engineer at Flight Research Center, has been chosen to receive the 1974 Hugh L. Dryden Memorial Fellowship. As the recipient, he will be granted a year of graduate study at Stanford University.

The award is presented by the National Space Club in honor of the late Deputy Administrator of NASA to provide employees of proven ability and outstanding potential the opportunity of undertaking concentrated study on long-range technical problems.

Edwards, 34, is a 1961 graduate of Yale University and received his Master's Degree in Physics from the University of Washington two years later. In addition to several years of extension courses at the University of Southern California and University of California at Los Angeles, he attended the UCLA School of Engineering in 1970-71.

An artist's sketch of the airplane and sampling system to be used in measuring pollution.

SURVEYING POLLUTION LEVELS

Jet aircraft pollution in the world's airlanes will be measured under a $1.1 million contract NASA has awarded United Air Lines, Inc., Chicago. The study is expected to aid scientists in determining effects, if any, of jet exhaust products on the natural environment, including effects on weather and human health.

Under the contract, United Air Lines will develop, test and fly a system on one of its 747 jumbo jets which can measure dust particles and gases in the airlanes. Flights will be made over the contiguous United States and Hawaii. In addition, United Air Lines will subcontract with an international air carrier (Pan American) to install another system on one of its 747s to sample atmospheric constituents in other parts of the world.

Porter J. Perkins, manager of the Global Air Sampling Program (GASP) at Lewis Research Center, said results should reveal to what extent, if any, jet aircraft emissions affect Earth's natural atmosphere. The survey may reveal any changes in the level of ozone which shields people on Earth from solar ultraviolet radiation; how much jet vapor trails contribute to cloud cover; and what proportion of dust particles in the airlanes is from aircraft.

NASA selected the Boeing 747 jet to carry the instruments because of its wide body and its modern air data computing system which records such information as location, altitude, air temperature, and air speed.

Air sampling is automatically activated once the plane achieves the proper flight altitude. A small tube protruding from the underside of the plane's nose takes in air for analysis.

Initially, the 747s will carry instruments which can detect four constituents: total suspended particles (dust particles), carbon monoxide, ozone, and water vapor. Later in the program as many as 10 instruments may be carried.

JOHNSON RETIREMENT ANNOUNCED

Vincent L. Johnson, Deputy Associate Administrator for Space Science, has retired from NASA effective Dec. 31, but will continue temporarily with the agency to complete work in which he is currently involved.

In making the announcement, Dr. James C. Fletcher, NASA Administrator, said: "Mr. Johnson has been an able and conscientious leader in advancing our unmanned space program, and we are sorry to see him go. We wish him all the best in the future."

Johnson joined NASA in 1960. His first assignments were as Program Manager for the Scout, Delta and Centaur launch vehicles. From 1964 to 1967, he was Director of the Launch Vehicle and Propulsion Programs in the Office of Space Science and Applications. His office also conducted research into future agency propulsion requirements. He was appointed Deputy Associate Administrator in 1970.

Prior to coming with NASA, he served as a physicist with the Naval Ordnance Laboratory, and later, during World War II, as a naval officer in the Bureau of Ordnance.

HARD-TO-ANSWER CALLS

In the December 15 issue of NASA ACTIVITIES, Government employees were advised to refer calls they cannot answer to Federal Information Centers in the areas involved. It was also mentioned that 36 cities have local FIC's, while in 37 others toll-free calls may be made through tie-lines.

The cities in which FIC's are located follow with telephone numbers:

Phoenix, AR (602) 261-3313; Los Angeles, CA (213) 688-3800; Sacramento, CA (916) 449-3344; San Diego, CA (714) 293-6030; San Francisco, CA (415) 556-6600; Denver, CO (303) 837-3602; Miami, FL (305) 350-4155; St. Petersburg, FL (813) 893-3495; Atlanta, GA (404) 526-6891; Honolulu, HI (808) 546-8620; Chicago, IL (312) 353-4242; Indianapolis, IN (317) 633-8484; Louisville, KY (502) 582-6261; New Orleans, LA (504) 527-6696; Baltimore, MD (301) 962-4980; Boston, MA (617) 223-7121.

Detroit, MI (313) 226-7016; Minneapolis, MN (612) 725-2073; Kansas City, MO (816) 374-2466; St. Louis, MO (314) 622-4106; Omaha, NE (402) 221-3353; Newark, NJ (201) 645-3600; Albuquerque, NM (505) 843-3091; Buffalo, NY (716) 842-5770; New York, NY (212) 264-4464; Cincinnati, OH (513) 684-2801; Cleveland, OH (216) 522-4040; Oklahoma City, OK (405) 231-4868; Portland, OR (503) 221-2222; Philadelphia, PA (215) 597-7042; Pittsburgh, PA (412) 644-3456; Memphis, TN (901) 534-3285; Fort Worth, TX (817) 334-3624; Houston, TX (713) 226-5711; Salt Lake City, UT (801) 524-5353; Seattle, WA (206) 442-0570.

Tie-line cities and numbers follow:

Birmingham, AL (205) 322-8591; Mobile, AL (205) 438-1421; Tucson, AZ (602) 622-1511; Little Rock, AR (501) 378-6177; San Jose, CA (408) 275-7422; Colorado Springs, CO (303) 471-9491; Pueblo, CO (303) 544-9523; Hartford, CT (203) 527-2617; New Haven, CT (203) 624-4720; Fort Lauderdale, FL (305) 522-8531; Jacksonville, FL (904) 354-4756; Tampa, FL (813) 229-7911; West Palm Beach, FL (813) 7566; Des Moines, IA (515) 282-9091; Topeka, KS (913) 232-7229; Wichita, KS (316) 263-6931; St. Joseph, MO (816) 233-8206.

Trenton, NJ (609) 396-4400; Santa Fe, NM (505) 983-7743; Albany, NY (518) 463-4421; Rochester, NY (716) 546-5075; Syracuse, NY (315) 476-8545; Charlotte, NC (704) 376-3600; Akron, OH (216) 375-5475; Columbus, OH (614) 221-1014; Dayton, OH (513) 223-7377; Toledo, OH (419) 244-8625; Tulsa, OK (918) 584-4193; Scranton, PA (717) 346-7081; Providence, RI (401) 331-5565; Chattanooga, TN (615) 265-8231; Austin, TX (512) 472-5494; Dallas, TX (214) 749-2131; San Antonio, TX (512) 224-4471; Ogden, UT (801) 399-1347; Milwaukee, WI (414) 271-2273.

HEADQUARTERS PRESS RELEASES

(Issued by the Public Information Division, Code FP, Headquarters, Washington, DC 20546. These releases are available only to members of the news media.)

74–1 Mossinghoff Appointed NASA Assistant Counsel
74–2 NASA plans 26 Launches in 1974
74–3 Marshall Center Plans Thermal Energy Demonstration
74–4 Dr. Homer Newell Announces Retirement
74–5 Vincent L. Johnson Announces Retirement
74–6 Powerful New Spotlight Developed from NASA Technology
74–7 NASA to Discontinue Audio-Visual Material
74–8 NASA to Launch 100th Delta Rocket
74–9 ASTP Working Groups to Meet
74–10 Space Technology Helps Prevent Oil Spills
74–11 Two Firms Will Compete for KSC Engineering Support Control

COMMUNITY AFFAIRS—At Flight Research Center, employees are actively involved in community affairs groups, such as the Antelope Valley Human Relations Council, a community action and advisory group interested in the abatement of discrimination. The officers of this group, shown here, are, (left to right, (top row), Steve Gilbreath, First Vice President, John Perry, President, and Hal Washington, Treasurer; (middle row), Yoshio Ekimoto and Matt Simon, Directors; and (bottom row), Larry Caw, Director, and Lurner Hunter, Secretary.

74–12 Radar Distinguishes Hills, Valleys on Mercury
74–13 Canadian Scientists Identify Water Molecules
74–14 NASA Names Del Riego to Congressional Liaison Post
74–15 NTE Unavailability of Color Photos
74–16 NASA Scientists Uncover Earth-like Molecules
74–17 Patent Licensing Conference Scheduled by NASA
74–18 Patient Workload Monitor Developed by NASA
74–19 Earth Observation Satellite
74–20 Airline Will Survey Pollution Levels
74–21 Student Writes Space Thesis on University Grant
74–22 Aeronautics Update
74–23 Site Chosen for Large Infrared Telescope
74–24 Mariner-Venus Encounter Press Kit
74–25 Titan Centaur Launch Press Kit
74–26 NASA ERTS Photos on View at AIAA Meeting
74–27 Prospecting w/Space Pictures
74–28 Note to Editors—Mariner/Venus Briefing
74–29 Patent Licensing Conference Rescheduled by NASA

NEW NASA PUBLICATION

GAMMA RAY ASTROPHYSICS, edited by Floyd W. Stecker and Jacob I. Tromba, is a report on an international symposium at the Goddard Space Flight Center held April 30-May 2, 1973. Papers on observations, theories, and cosmological implications are followed by a discussion of the future of gamma ray astronomy. The 412-page volume will be sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC. (NADS SP-339)

NEW PROGRAM AT FRC—Aerospace Awareness, a program that calls for recognition of individual and team performance in relation to goals, improved two-way communications, and the identification of potential cause for errors, has been initiated at Flight Research Center and is now spreading to other NASA projects. Here discussing it, left to right, are Dwayne Gray, Rockwell International, Special Advisor to NASA Headquarters for the program; Clyde Bailey, FRC Program Chairman; Lee Scherer, Center Director, and Al Chop, Headquarters representative of Rockwell International's Space Division and Editorial Manager of the Awareness Newsletter.

LUNAR SAMPLE EXHIBITS

The following is a schedule of lunar sample exhibits from Feb. 16 to March 15:

FLORIDA—Sun Coast Gem and Mineral Show, Gatewall Hall, St. Petersburg, March 8-10.

ILLINOIS—Triton College, 2000 Fifth Avenue, River Grove, March.

MASSACHUSETTS—Peabody Museum, East India Marine Hall, 161 Essex Street, Salem, February.

MINNESOTA—NASA Aerospace Education Community Involvement Program, Robbindale, Feb. 18-March 8.

NORTH CAROLINA—Schiele Museum of Natural History, 1500 Garrison, Gastonia, February.

OHIO—Fostoria Chamber of Commerce Home Show, Fostoria, Feb. 28-March 3.

SOUTH CAROLINA—Aiken Gem and Mineral Society Show, Kennedy Junior High School, Aiken, March 2-3.

TEXAS—Stephen F. Austin State University Science Fair, College Science Building, Nacogdoches, Feb. 21-23; Houston Museum of Natural Science/History, Houston, Feb. 15-March 15.

Permanent Displays

ALABAMA—Alabama Space and Rocket Museum, Marshall Space Flight Center, Huntsville.

FLORIDA—Visitor Information Center, Kennedy Space Center.

KANSAS—Eisenhower Library, 200 S.E. 4th Street, Abilene.

NEW YORK—United Nations Building, New York City.

OHIO—U.S.A.F. Museum, Wright Patterson Air Force Base, Dayton.

TEXAS—Johnson Library, University of Texas, Austin; Visitor Information Center, Johnson Space Center, Houston.

VIRGINIA—Visitor Information Center, Langley Research Center, Hampton.

WASHINGTON, DC—National Georgraphic Museum; Smithsonian Institution, National Air and Space Museum, 1000 Jefferson Drive, S.W.

Kennedy Space Center has requested bids on a 15,000-foot runway to be built for the Space Shuttle northwest of the Vehicle Assembly Building. It will be the prime launch and recovery site for the reusable Shuttle. The opening of bids is scheduled for Feb. 22.

NASA scientists have uncovered more evidence that life on primitive Earth may have been triggered by the chemical evolution of non-living matter.

In studies to find links between living and non-living matter, a team of researchers has discovered 17 varieties of fatty acids in two meteorites examined at Ames Research Center. The acids are similar to those used by plants and animals to produce even more complex biological molecules, and are commonly found in such household staples as milk, margarine, fruits and vinegar.

NASA TECH BRIEFS

(The Technology Utilization Office, NASA Headquarters)

(The following is a listing of published NASA Tech Briefs. Inquiries concerning them should be directed to the TU Office at the originating NASA Center.)

Innovator(s)	*Title*	*Number*	*Center*
P. C. Toole, Kennedy Space Center	High Speed Direct-Binary to Binary-Coded-Decimal Converter and Scaler.	73-10281	KSC
Siegfried Auer, Goddard Space Flight Center	Cosmic Dust or Other Similar Outer-Space Particles Location Detector.	73-10282	GSFC
R. S. Wriston, Martin Marietta Corp.	Measurement of X-Ray Scattering by Optical Surfaces	73-10283	GSFC
John J. DeLuca, Goddard Space Flight Center	Eutectic Bonding of Sapphire to Sapphire	73-10284	GSFC

WAIVER OF PATENT RIGHTS

(During the period of July through December, 1973, the Inventions and Contributions Board recommended that waiver of patent rights to inventions be granted to the NASA contractor organizations and individuals listed below. The Administrator of NASA subsequently reviewed the recommendations and granted the waivers. The grant of waivers gives a petitioner for patent waiver exclusive rights to commercialize an invention for the ultimate use by the general public while reserving to the government free use of the invention.)

Petitioner	*Title of Invention*
California Institute of Technology	Pocket Size Microwave Radiation Hazard Detector
Do.	Cross-Linked Polyelectrolytes
Do.	Purging Means & Method for Xenon Arc Lamps
Do.	Stark-Effect Modulation of CO^2 Laser With NH^2D
Do.	Method and Apparatus for Feeding Wire for Welding
Do.	Full Flow Fluid Meter
TRW, Incorporated	Superalloy Power Material Having Improved Stress Rupture Properties
Do.	Operation of ASTIC (Analog-Signal-to-Discrete Internal Converter) at Constant Frequency
Do.	Method for Electronically Deriving a Rate Signal from a Resolver
Do.	Pyrolytic Polymerization Catalyst
Hughes Aircraft Co.	Cooling Apparatus
Do.	Cooling Method
Vanderbilt University	Hypo-Cycloidal Pinch Device
Bell Aerospace Co.	Improved Lunar Band FM System for Voice Communications
S. E. Harris	Optical Radiation Frequency Converter and Method
Philco Ford	Voltage Controlled Variable Power Divider
McDonnell Douglas Corp.	Optical Modular System
Westinghouse Electric Corp.	Semiconductor Package for Avalanche Diodes and the Like Operable in the EHF Microwave Range
Esso Research & Engineering Co.	Regenerable Piezoelectric Dust Monitor
Calvin N. Wolff	Twin Film Heat Flux Meter
North American Rockwell Corp.	Shear Flexibility for Structures
Board of Trustees of The Leland Standford Jr. University	Miniature Intermittent Contact Switch
General Electric Co.	RF to Digital Converter
Honeywell, Incorporated	Control Apparatus Sensitive to Eye Movement

PATENTS AND INVENTIONS RESULTING FROM NASA RESEARCH

(The Office of General Counsel, NASA Headquarters, announces that the following U.S. patents have been issued by the U.S. Patent Office to NASA for inventions resulting from NASA research. Inquiries concerning them should be directed to the attention of the NASA Patent Counsel for the indicated installation.)

Inventor(s) and Employer	*Title of Invention*	*Patent No.*	*Installation*
Lawrence P. Ludwig and Thomas N. Strom, NASA/LeRC.	Spiral Groove Seal	3,782,737	LeRC
Peter G. Simmonds, Caltech/JPL	Compact Hydrogenator	3,782,904	NaPO
James M. Hoop, NASA/MSFC	Method and Apparatus for Non-Destructive Testing	3,782,177	MSFC

PATENTS AND INVENTIONS RESULTING FROM NASA RESEARCH—Cont.

Charles A. Grutler, NASA/LaRC	Duel Measurement Ablation Sensor	3,782,181	LaRC
Ernest J. Soter, NASA/LaRC	Modification of One-Man Life Raft	3,781,933	LaRC
Patrick J. Hand, Caltech/JPL	Temperature Compensated Digital Intertial Sensor	3,782,205	NaPO
Louis J. Koczela and Donald S. Wilgus, Rockwell, Autonetic, Anaheim, CA, and Irving Raymond Abel, Honeywell, Inc., Minneapolis, MN.	Adaptive Voting Computer System	3,783,250	JSC
Wing J. Wong, North American Rockwell, Downey, CA.	Phase Protection System for AC Power Lines	3,783,354	JSC
Helmut G. Lackner, NASA/MSFC	Method and Apparatus for Checking the Stability of a Setup for Making Reflection Type Holograms.	3,782,825	MSFC
Richard J. Parker, NASA/LeRC	Method of Making Rolling Element Bearings	3,781,958	LeRC
Stephen C. Irick, NASA/LaRC	Ejectable Underwater Sound Source Recovery Assembly	3,783,443	LaRC
Albert C. Krupnick, Carlo F. Kay and Roger J. Harwell, NASA/MSFC.	Nonflammable Coating Compositions	3,784,499	MSFC
Thomas J. Moore and Kenneth H. Holko, NASA/LeRC.	Diffusion Welding in Air	3,787,959	LeRC
Henry A. Leon, James P. Connolly, Maurice J. Hitchman and John E. Humbert, NASA/ARC.	Automatic Real-Time Pair-Feeding System for Animals	3,782,334	ARC
Thomas N. Canning, NASA/ARC	Heater-Mixer for Stored Fluids	3,782,698	ARC
Thomas N. Canning, NASA/ARC	Bimetallic Fluid Displacement Apparatus	3,782,699	ARC
James M. Black, NASA/FRC	Full-Wave Modulator-Demodulator Amplifier Apparatus	3,783,399	FRC/ ARC
Raymond L. Gause and C. G. Glenn, NASA/ MSFC.	Manual Actuator	3,788,163	MSFC
William G. Lewers, NASA/Wallops	Emergency Master Control Valve	3,788,390	LaRC

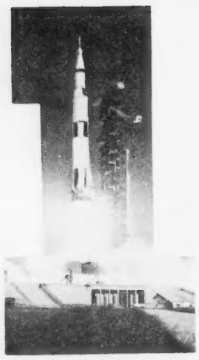
1974 LAUNCH SCHEDULE

Name	*Launch Date*	*Vehicle*	*Range*	*Mission/Remarks*	
Skynet II–A (UK)	Jan. 18 ..	Delta	ETR	Reimbursable launch. United Kingdom's communications satellite.	Launched
Centaur Proof Flight	Feb. 11 ..	Titan III–E Centaur ..	ETR	Test flight of booster planned for Viking Mars launch in 1975.	
San Marco (SM–C2)	Feb. 18 ..	Scout	SM	United States/Italy cooperative mission to conduct air density measurements.	
UK X–4	Feb.	Scout	WTR	Reimbursable launch. United Kingdom technology satellite with experiments related to spacecraft power systems, attitude control and stabilization.	
SMS–A	March	Delta	ETR	First prototype/developmental mission for geostationary meteorological operational satellite system; day and night continuous imaging of cloud cover; sophisticated remote-platform data-collection-and-weather data relay.	
WESTAR–A	April	Delta	ETR	Western Union communications satellite. Reimbursable launch.	
ATS–F	April	Titan III–C	ETR	Developmental and demonstrative communications mission using technology applicable to terrestrial and space needs; utilizes 9.15-meter (30-foot) deployable parabolic antenna and communications system with frequencies in several bands; will support public communications experiments in the U.S. and India.	

1974 LAUNCH SCHEDULE—Cont.

Name	*Launch Date*	*Vehicle*	*Range*	*Mission/Remarks*
SMS–B	May	Delta	ETR	Second prototype/developmental mission for geostationary meteorological operational satellite system; same as SMS–A; SMS–A and SMS–B will support GARP Atlantic Tropical Experiment (GATE).
Hawkeye (formerly Injun)	May	Scout	WTR	To study the topology of the magnetic field at large radial distance over the Earth's dgear caps and the interaction of the solar winds with the geomagnetic field.
Intelsat IV F–8	June	A–Centaur	ETR	One of a series of communications satellites to form part of a global communication commercial satellite system. Launch for COMSAT.
Nimbus F	June	Delta	WTR	Meteorological research and development mission to test instruments for expanding atmospheric remote sensing to cloud regions, extend observations to new spectral regions, extend sounding capabilities to higher altitudes, demonstrate feasibility for improvements to operational systems, and support GATE.
WESTAR–B	June	Delta	ETR	Western Union communications satellite. Reimbursable launch.
ITOS–G	July	Delta	WTR	Polar-orbiting operational meteorological satellite funded by NOAA; day and night cloud cover and temperature sounding.
GEOS–C	July	Delta	WTR	Geodynamic Experimental Ocean Satellite to demonstrate feasibility of satellite-altimeter techniques for measuring the topography of the ocean surface; can be significant contribution to understanding of ocean dynamics.
AEROS–B (German)	July	Scout	WTR	Spin-stabilized, Earth-orbiting satellite designed for upper atmosphere measurements.
Netherlands Sat.–A (ANS–A)	August	Scout	WTR	Designed to obtain data from celestial X-ray and ultraviolet sources.
GOES–A (SMS–C)	August	Delta	ETR	First Geostationary Operational Environmental Satellite, follow-on to SMS missions, funded by NOAA.
Helios–A	2nd Half	Titan III	ETR	To investigate the properties of and processes in interplanetary space in the direction of and close to the Sun by developing, launching and operating automated spacecraft.
Intelsat IV F–6	3rd Qtr.	.....	.....	One of a series of communications satellites to form part of a global communications commercial satellite system. Launch for COMSAT.
Skynet II–B (UK)	3rd Qtr.	Delta	ETR	Reimbursable launch. United Kingdom communications satellite.
WESTAR–C	October	Delta	ETR	Western Union communications satellite. Reimbursable launch.
Comsat–A	4th Qtr.	Delta	ETR	First of two maritime communications satellites to be situated over Atlantic and Pacific Oceans.
Symphonie–A (French/German)	4th Qtr.	Delta	ETR	Experimental communications satellite. Reimbursable.
Intelsat IV F–1	4th Qtr.	.....	.....	One of a series of communications satellites to form part of a global communication commercial satellite system. Launch for COMSAT.
UK–5	(Under Study)	.....	.....	To investigate galactic and extra galactic X-ray sources.

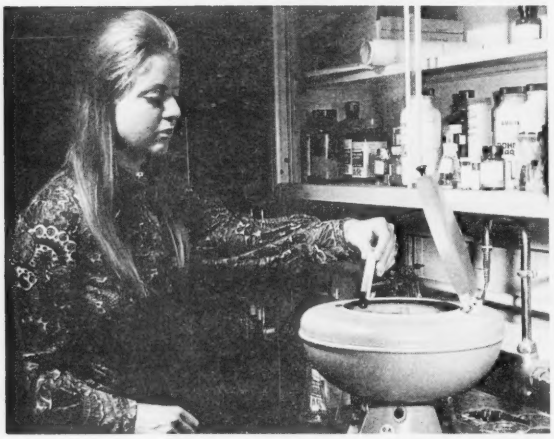
ARE YOU GETTING YOUR

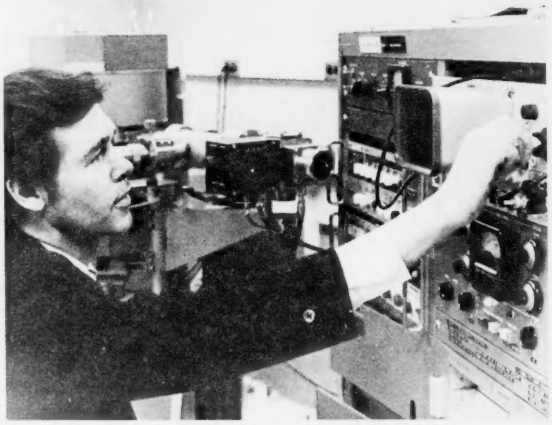


WORTH FROM SPACE?

FOR A PENNY OF YOUR TAX DOLLAR, YOU ARE GETTING ...

QUICKER, SAFER TREATMENT OF DRUG PATIENTS





Space science, through a cooperative effort on the part of NASA, the National Institute of Health and the Massachusetts Institute of Technology, now is employed to determine what drugs a patient, who is brought into a hospital in an unconscious condition and without medical identification, has ingested.

The procedure is a matter of analyzing body fluids. It takes only two hours; in the past, two days normally were required to obtain the same results.

When blood samples or other body fluids from a patient are received at the M.I.T. hospital in Boston where the project is centered, they are centrifuged to separate the heavier blood cells from the serum layer containing the drug. The serum layer then is placed in a small separatory funnel and treated with solvent, to further alienate the drug, after which it is reduced in volume by a rotary separator.

A small amount of the concentrated solution containing the drug is injected into a gascromatograph for separation into single components. These pass directly into a mass spectrometer, first used in analyzing rocks brought back from the Moon, which gives a fingerprint pattern of each compound. Next a computer, originally employed in the search for organic compounds on the Moon, prints out a list of drugs the patient has ingested.

At Boston, samples are handled on an emergency basis 24 hours a day for any hospital which requests an analysis. There is no charge for the service.

In the photograph at left, Dr. Katherine Costello, in charge of the project in the M.I.T. hospital, stands beside the centrifuge. At right is Dr. Klaus Bieman, professor of chemistry at M.I.T., who developed the computer.

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

"FOR THE BENEFIT OF ALL MANKIND."

AMERICAN REVOLUTION BICENTENNIAL 1776-1976